

5.16.63 METHOD FOR DETERMINING DRAINDOWN CHARACTERISTICS IN UNCOMPACTED ASPHALT MIXTURES (Kansas Test Method KT-63)

a. SCOPE

a.1. This test method covers the determination of the amount of draindown in an uncompacted asphalt mixture sample when the sample is held at elevated temperatures comparable to those encountered during the production, storage, transport, and placement of the mixture. The test is particularly applicable to mixtures such as open-graded friction course and Stone Matrix Asphalt (SMA).

b. REFERENCED DOCUMENTS

- b.1.** AASHTO M 92; Wire-Cloth Sieves for Testing Purposes
- b.2.** AASHTO T 245; Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus
- b.3.** AASHTO T 305; Determination of Draindown Characteristics in Uncompacted Asphalt Mixtures

b. SIGNIFICANCE AND USE

b.1. This test method can be used to determine whether the amount of draindown measured is within acceptable levels. The test provides an evaluation of the draindown potential of an asphalt mixture during mixture design and/or during field production. This test is primarily used for mixtures with high coarse aggregate content such as open-graded friction course and SMA.

c. APPARATUS

- c.1.** Forced draft oven – capable of maintaining the temperature in a range from 250-350°F (120-175°C). The oven should maintain the set temperature to within $\pm 3.6^\circ\text{F}$ ($\pm 2^\circ\text{C}$).
- c.2.** Plates – or other suitable containers of appropriate size. The plates or containers used should be of appropriate durability to withstand the oven temperatures. Cake pans or pie tins are examples of suitable types of containers.
- c.3.** Standard basket – meeting the dimensions shown in Figure 1. The basket shall be constructed using standard 0.25 in (6.3 mm) sieve cloth as specified in M 92.
- c.4.** Spatulas – trowels, mixer, and bowls as needed.
- c.5.** Balance – accurate to 0.1 gram.

d. SAMPLE PREPARATION

d.1. Laboratory Prepared Samples:

d.1.a. Number of Samples – for each mixture tested, the draindown characteristics should be determined at two different temperatures. The two temperatures should be the anticipated plant production temperature as well as 27°F (15°C) above^a.

Note **a**: When using the test as part of the mixture design procedure, the test should be performed at two temperatures in order to determine the potential effect that plant temperature variation may have on the mixture during production. When the test is used in the field during production, it should be necessary to perform the test at the plant production temperature only.

d.1.b. Dry the aggregate to constant mass at 221-230°F (105-110°C) and separate the aggregates by dry-sieving into the appropriate size fractions. The following size fractions are recommended:

1 to 3/4 in (25.0 to 19.0 mm)
3/4 to 3/8 in (19.0 to 9.5 mm)
3/8 to No. 4 (9.5 to 4.75 mm)
No. 4 to No. 8 (4.75 to 2.36 mm)
Passing No. 8 (Passing 2.36 mm)

d.1.c. Determine the anticipated plant production temperature or select a mixing temperature which will produce a viscosity of 170 ± 20 cSt upon heating.

d.1.d. Place into separate pans for each test sample the amount of each size fraction required to produce completed mixture samples having a mass of 1200 ± 200 grams. The aggregate fractions shall be combined such that the resulting aggregate blend has the same gradation as the job-mix-formula. Place the aggregate samples in an oven and heat to a temperature not to exceed the mixing temperature established in Section **d.1.c.** by more than approximately 50°F (28°C).

d.1.e. Heat the asphalt cement to the temperature established in Section **d.1.c.**

d.1.f. Place the heated aggregate in the mixing bowl. Add any stabilizers^b and thoroughly mix the dry components. Form a crater in the aggregate blend and add the required amount of asphalt. The amount of asphalt shall be such that the final sample has the same asphalt content as the job-mix-formula. At this point, the temperature of the aggregate and asphalt cement shall be within the limits of the mixing temperature established in Section **d.1.c.** Using a spatula (if mixing by hand) or a mixer, mix the aggregate (and stabilizer if any) and asphalt cement quickly until the aggregate is thoroughly coated.

Note **b**: Some types of stabilizers such as fibers or some polymers must be added directly to the aggregate prior to mixing with the asphalt cement. Other types of stabilizers must be added directly to the asphalt cement prior to blending with the aggregate.

d.2. Plant Produced Samples:

d.2.a. Number of Samples – For plant produced samples, duplicate samples should be tested at the plant production temperature.

d.2.b. Samples may be obtained during plant production by sampling the mixture at any appropriate location such as the trucks prior to the mixture leaving the plant. Samples obtained during actual production should be reduced to the proper test sample size by the quartering method.

Note **c**: Caution should be exercised when sampling from surge or storage bins because draindown may already have taken place.

e.1. PROCEDURE

e.1.a. Transfer the hot laboratory produced or plant produced uncompacted mixture sample to a tared wire basket as described in Section **c.3**. Place the entire sample in the wire basket. Do not consolidate or otherwise disturb the sample after transfer to the basket. Determine the mass of the sample to the nearest 0.1 gram. Care should be exercised to ensure that the sample does not cool more than 77°F (25°C) below the test temperature (see Section **e.1.b.**).

e.1.b. Determine and record the mass of a plate or other suitable container to the nearest 0.1 gram. Place the basket on the plate or container and place the assembly into the oven at the temperature as determined in Section **d.1.a.** or **d.2.a.** for 1 hour \pm 5 minutes. If the sample has cooled more than 77°F (25°C) below the test temperature, the test should be conducted for 70 \pm 5 minutes.

e.1.c. After the sample has been in the oven for the time specified in Section **e.1.b.**, remove the basket and plate or container from the oven. Determine and record the mass of the plate or container plus drained asphalt cement to the nearest 0.1 gram.

f. CALCULATIONS

f.1. Calculate the percent of mixture that drained by subtracting the initial plate or container mass from the final plate or container mass and divide this by the initial total sample mass. Multiply the result by 100 to obtain a percentage.

g. REPORT

g.1. Report the average percent drainage at each of the test temperatures.